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XXXIV. *Some remarks on Hydrocyanic Acid.*
By J. T. COOPER, Esq., *Lecturer on Chemistry, &c.*[*]

IN the month of November 1831 I prepared some anhydrous hydrocyanic acid, by passing a current of dry sulphuretted hydrogen through a tube containing dry cyanide of mercury, and condensed the product by a freezing mixture surrounding the receivers; almost immediately after its preparation its specific gravity was taken at the temperature of 37° Fahr., which was found to be 0·706; and in two hours and a half after its preparation, I proceeded to determine its refractive index, by inclosing a portion of the acid in a perfectly air-tight hollow prism, whose refracting angle was 49° 15′ 40″, which, adopting the notation of Sir J. F. W. Herschel, we will call $\angle$ I; then by a very simple instrument which I am in the habit of using for these purposes, the angle D, or that made by the incident and refracted ray, was found to be for Frauenhofer's ray A 14° 41′, and for ray H 15° 13′ 30″. Hence by adopting Sir J. Herschel's formula, viz. $\mu = \dfrac{\sin\left(\frac{D}{2}+\frac{I}{2}\right)}{\sin\frac{I}{2}}$ in which expression μ represents the refractive index, we have

$$\text{Temp. } 37^\circ \left\{ \begin{array}{llll}
\text{for ray A} & \frac{D}{2} = 7^\circ\ 20'\ 30'' & & \\
\text{extreme red} & \frac{I}{2} = 24\ 37\ 50 & \text{log. sin.} & 9{\cdot}61989 \\
 & \left(\frac{D}{2}+\frac{I}{2}\right) = 31\ 58\ 20 & \text{log. sin.} & 9{\cdot}72387 \\
 & \mu = 1{\cdot}2705 & \text{log.} & {\cdot}10398 \\
\text{and for ray H} & \frac{D}{2} = 7\ 36\ 45 & & \\
\text{extreme violet} & \frac{I}{2} = 24\ 37\ 50 & \text{log. sin.} & 9{\cdot}61989 \\
 & \left(\frac{D}{2}+\frac{I}{2}\right) = 32\ 14\ 35 & \text{log. sin.} & 9{\cdot}72714 \\
 & \mu = 1{\cdot}2801 & \text{log.} & {\cdot}10725
\end{array}\right.$$

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[*] Communicated by the Author, from whom it was received in the course of last month.—EDIT.

$$\begin{array}{lrlr}
\mu \text{ for ray A} = & 1{\cdot}2705 & \qquad \mu \text{ for ray H} = & 1{\cdot}2801 \\
\mu \text{ for ray H} = & \underline{1{\cdot}2801} & \qquad \mu \text{ for ray A} = & \underline{1{\cdot}2705} \\
 & 2\overline{)2{\cdot}5506} & \qquad \delta\mu = & {\cdot}0096 \\
 & \overline{1{\cdot}2753} & &
\end{array}
\quad \therefore \frac{\delta\mu}{\mu - 1} =$$

$$= \frac{{\cdot}0096}{{\cdot}2753} = {\cdot}0035 = p \text{ its dispersive power.}$$

With a view of ascertaining whether any and what change the acid so prepared would undergo in the course of time, it was put into a stoppered phial, which had also a cap or cover of glass fitted over the stopper, so as the more effectually to secure the acid from evaporation, and the phial was then put into a tin box to exclude it from the action of light; and so *carefully* was this put aside, that I lost all trace of it until a few weeks since, when upon re-examination, I found, that to appearance, as far as I can remember the quantity the phial contained, it has suffered no diminution in bulk, nor was it perceptibly altered in appearance excepting a very minute deposit of a light grey matter, which I believe to be lead derived from the glass; and on retaking its specific gravity and its refractive index, there was found to be no appreciable difference from the results formerly obtained in either.

The above facts go to prove that real hydrocyanic acid, prepared by the above process, is capable of being preserved for a length of time in close vessels if light be excluded; the same portion of acid is now, and has been for more than a fortnight, exposed to diffuse daylight, and as yet has shown no signs of decomposition; indeed, having frequently for the purpose of demonstration had occasion to prepare the anhydrous acid, I have remarked, contrary to the general opinion, that the acid so prepared, under ordinary circumstances of keeping, that is, of exposure to common daylight, that not one portion in five or six undergoes any change by depositing the peculiar brown matter, if the phials are perfectly well stopped. If the stability of this acid should ultimately turn out to be different from what is generally imagined, it is not improbable that in consequence of its possessing so low a refractive index and dispersive power, that it may be made available for some useful optical purposes.

Now it has been stated by Dr. Brewster, that the refractive index of cyanogen liquefied by pressure is 1·316; hence it is possible, I conceive, to deduce, without the risk of incurring any very considerable error, what the refractive index of hydrogen would be if it were possible to obtain that body in a liquid state; for as hydrogen and cyanogen combine in equal volumes to form hydrocyanic acid, and their union occurs in the gaseous state without any condensation of volume, it may be presumed that if we subtract the refractive index of hydrocyanic acid from that of cyanogen, viz. ·275 from ·316 = ·041 for the refractive index of liquid hydrogen.

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